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FEDERAL FACILITY
PRELIMINARY ASSESSMENT/SITE INSPECTION REVIEW

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FACILITY: Kapalama Military Reservation, Oahu, Hawaii

EPA ID#s: HI621452207

DOH REVIEW/CONCURRENCE

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1. INTRODUCTION

In accordance with Section 120 of the Superfund Amendments and Reauthorization Act of 1986, all federal facilities listed on the Federal Agency Hazardous Waste Compliance Docket were required to submit a Preliminary Assessment (PA) to the U.S. Environmental Protection Agency (EPA) by April 17, 1988. Upon completion of the PA, facilities were required to perform a Site Inspection (SI) of the sites at the facility that warranted further investigation. The Hawaii State Department of Health (DOH) has contracted the University of Hawaii Environmental Center (UHEC) to review the Preliminary Assessment/Site Inspection (PA/SI) submitted by the U.S. Army Corps of Engineers for the Kapalama Military Reservation (KMR) to ensure that an accurate response determination is made.

The purpose of the Federal Facility Review is: 1) to determine if the PA/SI submitted has appropriately discussed and evaluated all potential sources or areas of contamination at the facility, 2) to determine if the recommendations and conclusions reached by the facility are appropriate, 3) to ascertain if sufficient information has been provided to make a determination of the need for further action and, 4) to establish whether continued EPA involvement is warranted.

The strategy for determination of further action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is based solely on a facility's potential to achieve a sufficient score on the final revised Hazard Ranking System (HRS) for inclusion on the National Priorities List (NPL). This strategy is intended to identify those sites posing the highest relative risk to human health and/or the environment.

This PA/SI review is based on documentation made available to the Environmental Center from DOH files. For the purposes of clarification of terminology and consistency with HRS definitions, all sites identified at KMR will hereafter be referred to as sources. The following is a summary of our findings with regard to the Kapalama Military Reservation, Oahu, Hawaii.

2. EXECUTIVE SUMMARY

Kapalama Military Reservation (KMR), Honolulu, Hawaii site occupies 80.1 acres (not including the ceded portion) located on the south side of the Island of Oahu (latitude 21 20' 05" North and longitude 157 55' 15" West) in the State of Hawaii (Figure 1). KMR was divided into four parcels for the purposes of property disposal. Phase I lot of 14.4 acres was sold to Servco Pacific, Inc., in 1987. The current assessment focusses on the

remaining 65.4 acres of the reservation. The KMR property was acquired by the U.S. Government through condemnation by the Secretary of War in 1941 and 1942. It was subsequently established as a logistics support and warehouse facility. Activities have consisted primarily of the receiving, storage, and distribution of goods and materials for U.S. military facilities in the Hawaiian Islands and throughout the Pacific area.

Chemicals such as battery acids, cleansers, packing foam, paints and pesticides are stored in 55-gallon or less containers. In addition, operation of a mortuary, an identification laboratory for decomposed bodies and certain maintenance and repair activities (including painting and fumigation) have occurred on the site. The site also had underground storage tanks (UST) for petroleum products. In addition many of the buildings on the reservation contain asbestos containing building materials (ACBM) and transite sidings.

The Hawaii State Department of Health (DOH) has contracted the University of Hawaii Environmental Center (UHEC) to review the PA/SI submitted by the U.S. Army Corps of Engineers for the KMR to ensure that an accurate response determination is made.

The primary sources of information for this review were the following:

1. Environmental Assessment for Kapalama Military Reservation Sale and Replacement Program, Phase I prepared by the U.S. Army Support Command, Hawaii (November 1, 1985).

2. Environmental Assessment for Sale and Replacement, Phase II Kapalama Military Reservation, prepared by the U.S. Army Support Command, Hawaii (November 1, 1988).

3. Final Environmental Assessment for Base Realignment and Closure of Kapalama Military Reservation, Phase III Portion, prepared by the U.S. Army Support Command Hawaii (July 31, 1991).

4. Kapalama Military Reservation, Task Order 2, Enhanced Preliminary Investigation prepared for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) by Roy F. Weston, Inc. (February 1990).

5. Kapalama Military Reservation Site Investigation, Draft Final Technical Plan prepared for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) by Environmental Science & Engineering, Inc. (May 1990).

6. Kapalama Military Reservation Site Investigation, Final Technical Plan prepared for the U.S. Army Toxic Hazardous

Materials Agency (USATHAMA) by Environmental Science & Engineering, Inc. (July 1990).

7. Kapalama Military Reservation Site Investigation, Final Report prepared for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) by Environmental Science & Engineering, Inc. (September 1990).

Additional information on KMR's current site practices was obtained from a site visit (11/91), and personal communication with U.S. Army Support Command, Hawaii personnel.

During the SI process, soil and storm sewer sediment samples were tested for heavy metals, PCBs, and pesticides. Concrete samples from buildings were tested for the same. Eighteen monitoring wells were dug to test for groundwater contamination. In addition, destructive sampling of the buildings was done to have an estimate of the quantity of Asbestos Containing Building Materials (ACBM).

Review of the available data for the KMR indicates that the facility may be eligible for inclusion on the NPL. There are significant quantities of hazardous wastes in the soil, sediments, concrete floors of buildings and shallow groundwater (Environmental Science & Engineering, 1990). Some of the buildings pose a potential hazard because they contain Asbestos Containing Building Materials (ACBM). In addition, there are two pre-construction sanitary landfill sites at the KMR. Information on the type and quantities of wastes disposed in the landfill sites is not available from either the Military or the State authorities.

Contaminants will eventually migrate to surrounding coastal waters through groundwater migration or surface runoff. The possibility of contaminants entering the drinking water supply, though remote cannot be ruled out as no aquifer discontinuity can be established between the contaminated shallow groundwater aquifer and the Honolulu aquifer which contributes to the drinking water supply in the area. Contaminated soil may pose a threat to the facility personnel by ingestion, dermal contact or inhalation.

3. FACILITY DESCRIPTION: Kapalama Military Reservation

3.1 SITE LOCATION

Kapalama Military Reservation (KMR) is a 80.1 acre site located on the south side of the Island of Oahu, in the state of Hawaii. Figures 1 and 2 show respectively, the site location and the property subdivision of the KMR. The reservation lies on the

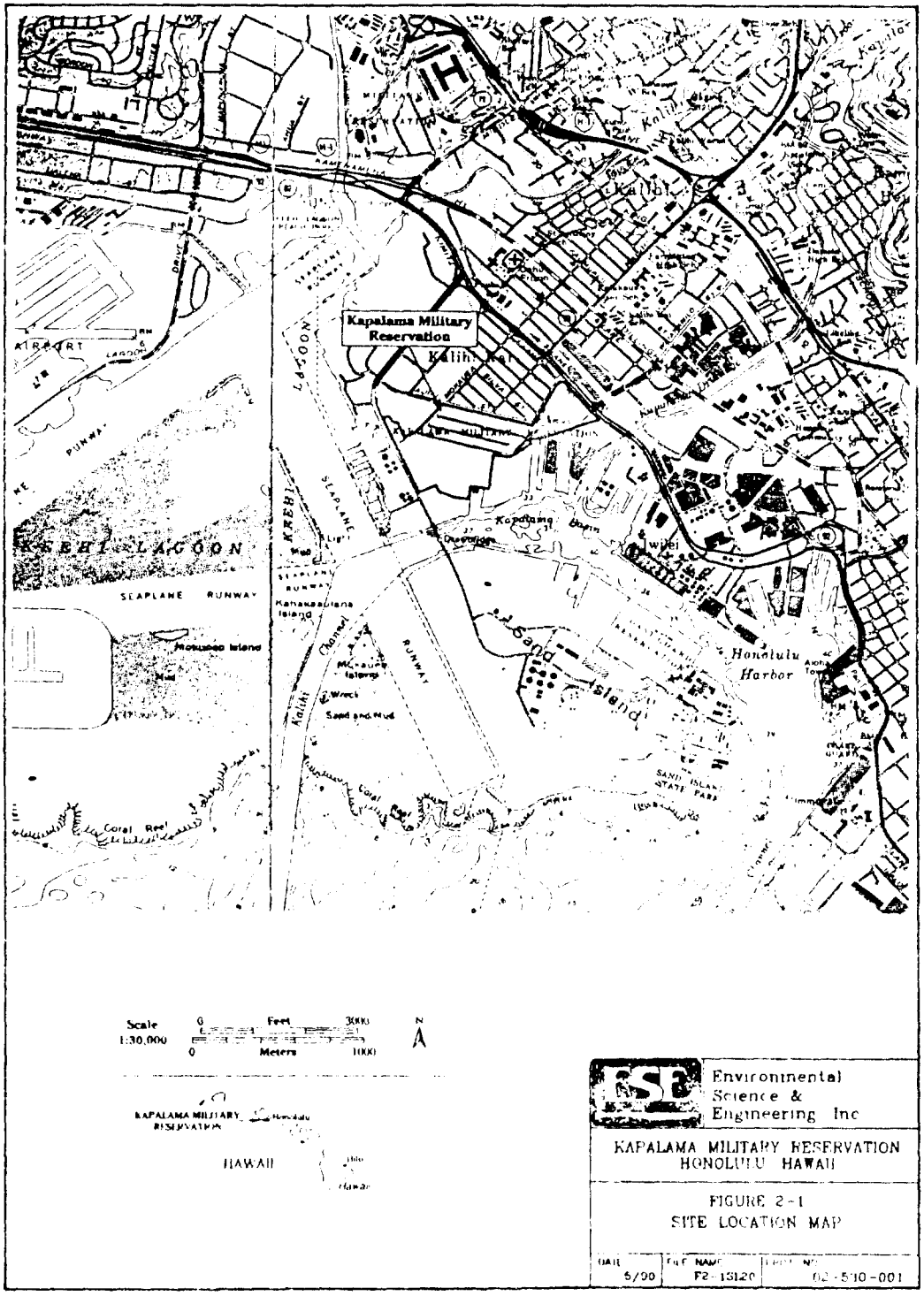

Figure 1. Kapalama Military Reservation, Site Location (E & E, 1990).

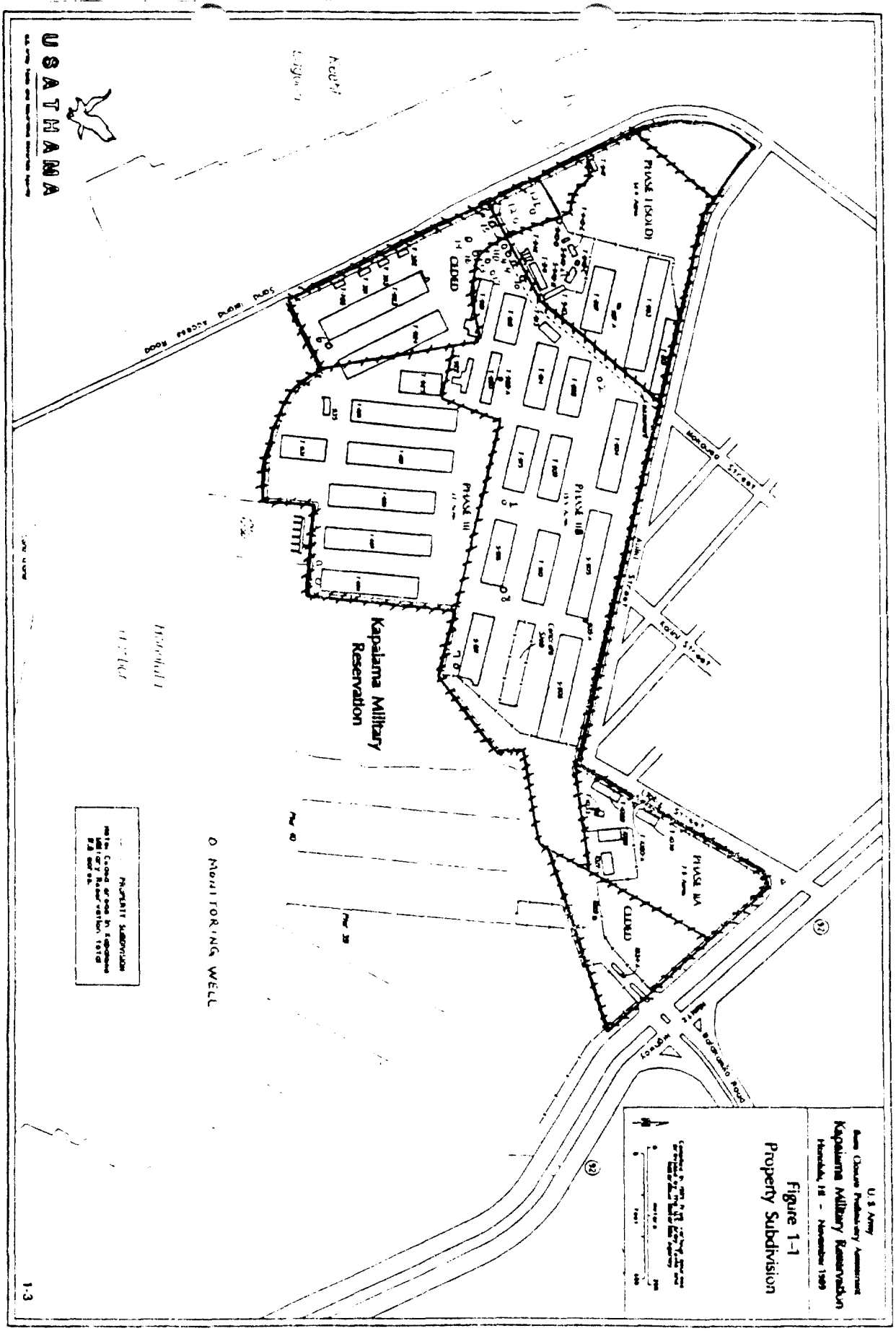

Figure 2. Kapalama Military Reservation, Property Subdivision (E & E, 1990).

low-lying coastal plain between Keehi Lagoon on the east, Kapalama basin on the south and southwest, and Kalihi Kai to the north. Kapalama drainage canal flows into the Kapalama basin along the northwestern edge of the site. Sand Island lies across the Kalihi channel to the south and southwest of the site.

Kalihi Kai and Kalihi are the large population centers in the proximity of KMR. The facility is divided into three parcels. Table 1 shows the areas of the different parcels. Phase I was sold to Servco Pacific, Inc. by the legislation PL 99-661 section 2740, 11/14/1986. Phase IIA was sold to the state by the legislation PL 100-180 section 2332, MCA FY 88/89. Phase IIB was sold to the state by legislation PL 100-180 section 2332 amended by PL 101-189 section 2814. The State purchased and closed Phase II although Army personnel are still allowed to stay until September 1993. Phase III is still with the Army. As of 1990 there were approximately 83 civilian personnel, working on phase III (Sueda, pers. comm., 1991).

Table 1. Property parcels at the Kapalama Military Reservation (ES&E, 1991).

PARCEL	ACREAGE
Phase I	14.4 acres
Phase IIA	7.8 acres
Phase IIB	35.9 acres
Phase III	22.0 acres
Ceded property	17.8 acres

3.2 HISTORICAL AND OWNER/OPERATOR HISTORY

KMR was acquired by the U.S. Government through condemnation by the Secretary of War in 1941 and 1942. Since then it has been mainly used as a logistics support and warehouse facility. Activities have consisted of receiving, storing and distributing goods and materials for U.S. military facilities in the Hawaiian islands and throughout the Pacific area. These goods and items have included hardware items (office furniture, hospital beds, appliances, spare parts), consumer items as sold in Post Exchanges, dry goods (tents, clothing), and chemicals (battery acids, cleansers, packing foam, paints, pesticides) in containers no larger than 55-gal capacity. In addition, operation of a mortuary, an identification laboratory for decomposed bodies and certain maintenance and repair activities (including painting and fumigation) have occurred on the site.

Use of the property prior to the construction of the KMR is

not well documented. A portable asphalt batching plant was condemned when the Army purchased the property. There are two pre-construction disposal sites on the reservation which are thought to be municipal sanitary landfills (Weston, 1990). A portion of the site also may have been used as a junk yard.

3.3 PRESENT FACILITY MISSION

KMR is a part of the U.S. Army Support Command. It is a logistics and support facility and a general maintenance installation.

Current operations include warehouse and storage facilities, administration buildings, office machine and furniture repair, an Army mortuary, and the Pacific Area Central Identification Laboratory.

3.4 FACILITY PROCESSES/WASTE MANAGEMENT

KMR is not permitted to be a waste generator and transporter under the Resource Conservation and Recovery Act (RCRA) and does not have a RCRA-assigned EPA ID# (Simmons, pers. comm.). Over the lifetime of KMR, site activities have generated hazardous wastes such as pesticides and heavy metals. In addition, the release of petroleum hydrocarbons can be conclusively demonstrated by the analysis of groundwater samples.

Since, the site is almost entirely paved and covered with asphalt, storm drains are the pathway for the transport of contaminants to the ocean through surface water. Groundwater flow is towards the ocean and contaminated groundwater gradually discharges into the ocean.

4. APPARENT PROBLEM

The areas where hazardous materials are managed were documented in the Enhanced Preliminary Assessment conducted for the USATHAMA by Roy F. Weston, Inc. They include:

1. Buildings 913/914 - Mortuary.
2. Building 917 - Hazardous material storage.
3. Building 923 - Solvent cleaning room and spray paint booth.
4. Building 924 - Canvas repair area & packaging area.
5. Building 925 - Maintenance & repair of forklifts.
6. Building 926 - General storage & sealed source radioactive storage.
7. Building 929 - General storage and former pallet fumigation area

8. Building 930 - General purpose storage.
9. Building 931 - General storage & fumigation area.
10. Building 1027/1028 - Central identification laboratory.
11. Former Underground Storage Tank across from Buildings 1027 and 1033.
12. Underground Storage Tank - Adjacent to Building 935.
13. Above ground Storage Tanks
14. Asbestos
15. Transformers
16. Concrete Pad
17. Former Railroad track/unloading area
18. Pre-Construction landfill sites

The areas of concern identified in the SI Report were as follows:

1. Building 917 - Hazardous Material Storage:

Chlordane and lead were detected in samples from the concrete floor in concentrations exceeding RCRA Toxicity Characteristic (TC) levels. The pesticides DDD, DDE, and DDT were detected in samples from the concrete and surface wipe samples at concentrations below the RCRA Toxicity Characteristic (TC) levels. There were no conditions observed to be contributing actively to contamination of the concrete at the time of the investigation. The SI asserted that any spills that were washed out of the building would have drained into the storm sewers, which empty into the ocean. The SI recommended:

a. Testing of concrete by Toxicity Characteristic Leaching Procedure (TCLP) method prior to demolition to determine if it is a hazardous waste.
b. Avoiding the area for food preparation and storage.
c. Avoidance of skin contact with the floor.
d. Applying a suitable chemical encapsulement to seal the concrete surface.

2. Building 923 - Solvent Cleaning Room and Paint Spray Booth:

Lead was detected in paint scrape samples in concentrations ranging from 4410 to 9610 ppm. The one concrete sample from a spray paint booth contained 2450 ppm lead. The SI concluded that lead concentrations in the paint spray booth walls, ceiling, and concrete flooring exceeded the RCRA Toxicity Characteristic (TC) levels for lead and recommended:

a. Testing of paint coated components by RCRA Toxicity Characteristic Leaching Procedure (TCLP) method prior to demolition to ensure proper disposal.

b. Prohibition of hot work (such as welding) or grinding on lead coated components to avoid the generation of airborne lead hazards.

3. Building 924 - Canvas Repair Area and Packaging Area:

Chlordane and lead were detected in samples from the concrete foundation. The SI recommended:

a. Analysis of additional samples by Toxicity Characteristic Leaching Procedure (TCLP) to determine the hazardous constituent status, if the building were to be demolished.

4. Building 929 - General Storage and former Pallet Fumigation Area:

Pentachlorophenol (PCP) was detected in wood, insulation pallets, and in concrete near the fumigation room at levels much lower than the RCRA Toxicity Characteristic (TC) levels for PCP. The SI recommended that:

a. The persons engaged in the construction and demolition in the area should be informed of the presence of Pentachlorophenol (PCP).

5. Building 931 - General Storage and Fumigation Area:

Pentachlorophenol (PCP) was detected in concrete within the fumigation area. Concentrations detected were below the RCRA Toxicity Characteristic (TC) levels.

6. Storm Sewer System:

Lead was detected at a concentration of 12,700 ppm at the inlet between buildings 923 and 924. Total Petroleum Hydrocarbons (TPH) were detected at a concentration of 33,700 ppm at the storm drain inlet at the south end of the building 925. The fork-lift operation is the most likely source of this contamination. The SI recommended:

a. Inspection and periodic checks to determine if solvent handling procedures are adequate at the location of the fork-lift operation.

7. Asbestos:

Asbestos Containing Building Materials (ACBMs) were detected in building's 923, 925, 926, 927, 928, 929, 930, 931, and 935. The asbestos is non-friable. Friable refers to asbestos that can be pulverized under hand pressure. The SI concluded that asbestos in the buildings did not pose a significant hazard to the building tenants or the environment so long as it was not made friable and recommended that:

a. The Asbestos containing floor covering in buildings be kept sealed (i.e. waxed) and not be mechanically buffed or

stripped.

b. All identified Asbestos Containing Building Materials (ACBM) in buildings be removed prior to any planned demolition or renovation by a qualified contractor, experienced in the removal of non-friable ACBMs.

8. Transformers (all areas):

There are approximately 40 oil-filled transformers on the KMR facility. Two apparently minor leaks were observed in the Phase II area. There was a reported PCB leak from a pole mounted transformer outside Building 935 in 1991 (Riki Iwasaki, pers. comm.). The total quantity of PCBs leaked was estimated to be 2 gallons. The contaminated soil around the site was excavated and removed according to EPA and DOH procedures. The transformer pole was removed and disposed in a similar fashion. No other transformers were tested for PCBs.

The Site Investigation detected a plume of hydrocarbon constituents in the vicinity of the Underground Storage Tank, that had been removed previously. The SI concluded that the plume did not pose a problem as it was localized and was in a brackish, non-potable aquifer.

REVIEWER'S RECOMMENDATIONS

In its analysis of the sources of concern, the SI overlooked the contribution of the pre-construction landfill sites. The nature and quantities of wastes disposed in the landfill sites is unknown. The PA identified approximate locations of the two landfill sites and recommended soil borings and monitoring wells for analyses for the constituents included on the Hazardous Substance List (HSL). These recommendations were not followed during the Site Investigation for reasons unknown. The landfill sites represent sources of concern and testing recommended in the PA should have been done to get an idea of the nature and degree of contamination.

Some of the SI recommendations are insufficient. We recommend the following measures to control the release of hazardous materials on site:

1. Storm Sewer System: Building 923 may be source of lead into the storm drains. Use of lead based paints should be stopped and contaminated surfaces in the paint booth should be remediated immediately to prevent further transport to the storm drains.

2. Transformers: According to the PA, the transformers at KMR

are in varying physical conditions (Weston, 1990). The SI Report did not identify transformers on-site as a source of concern. However, observed releases of PCBs have occurred, some as recently as 1991. Since all of the transformers may contain PCBs, testing for leaks should be done at the site to avoid spills of the sort that occurred outside Building 935 in 1991 (after the SI Report).

3. Drums containing waste oil: Containment should be provided for the drums containing waste oil to prevent the contamination of soil and groundwater by accidental leakages or spills.

4. Asbestos: Most buildings at the KMR contain ACBMs. Asbestos is a source of potential contamination. The assertion of the SI that asbestos on-site is friable, and does not pose a hazard to the site personnel is based on the assumption that ACBMs on site (vinyl floor tile, transite wallboard, transite siding and wall insulation) are non-friable. The SI acknowledges that these materials can be made friable by handling practices and recommends careful handling practices. The argument does not take into account the fact that asbestos may already by friable due to past and present handling practices. Particulate air sampling inside the buildings is one way of making a determination of the hazards posed by asbestos. This is recommended to have an accurate idea of the nature and extent of asbestos hazard. In the absence of sampling, it cannot be conclusively demonstrated that the asbestos does not pose a hazard to site personnel.

5. HAZARD FACTORS

The Hazard Ranking System (HRS) is a scoring system used to assess the relative threat associated with actual or potential releases of hazardous substances from sites. It is the principal mechanism EPA uses to place sites on the National Priorities List (NPL). EPA has completed revisions to the HRS, pursuant to the Superfund Amendments and Reauthorization Act of 1986 (SARA). The following HRS factors have been evaluated for the Kapalama Military Reservation.

5.1 WASTE TYPE AND QUANTITY

There are no records of waste quantities and wastestreams in any of the documents reviewed. KMR is not a designated generator of wastes. Therefore there are no records of waste quantities.

Operations at the KMR that have generated hazardous waste

include accidental spills during storage and handling of chemicals, possible leaks from drums containing waste oils and solvents, possible leaks from transformers, release of lead from the spray painting operation in Building 923, release of chemicals during fumigation in Buildings 929 and 931 and leaks of petroleum hydrocarbons from Underground Storage Tanks (UST).

Petroleum, including crude oil and its fractions, is excluded from the definitions of "hazardous substance" and "pollutant or contaminant" in CERCLA Sections 101(14) and (33). Therefore, releases of pure petroleum products such as fuel oil, leaded gasoline, etc. are not evaluated under CERCLA. Waste oil and petroleum hydrocarbons used as solvents (i.e., toluene) are not excluded from CERCLA, and are included in this evaluation.

There were two City & County landfill sites that were operated on the present location of KMR up to the 1940s. The Office of Solid Wastes, State of Hawaii does not have any records of the type of wastes disposed in the landfill, as waste disposal records were not required until the mid 1970s (Siu, pers. comm.).

None of the sources at KMR have any containment measures for the prevention of migration of contaminants. Thus, it is assumed that any release is potentially available to the environment.

The PA and SI provide information about the waste types and concentrations at different places on site but there is no information on waste quantities. For the sake of estimation the wastes on site can be divided into three categories:

1. Wastes stored at the site: Waste oil drums and transformers come in this category. The estimation of waste quantities can be done with a degree of accuracy. Asbestos Containing Building Materials (ACBMs) can be included in this category because they are a source of potential contamination and their impact on human receptors on-site has not been assessed.

2. Wastes being generated due to operations on site: This category would include the heavy metals and chlorinated pesticides detected in the soil, building floors, groundwater and storm sewer sediments. These wastes are/have been generated during the storage, transportation and maintenance operations at the KMR. They are available for migration to the groundwater, surface water, soil and air pathways

3. Pre-Construction Landfills: Contamination due to the pre-construction landfills under the present locations of Building 926 and 930 respectively was not analyzed in the SI testing. Thus the impact of the landfills on contamination of the site is unknown. The impact of the landfill may vary

depending upon the type and quantity of wastes in it. Data on groundwater and soil contamination in the area of the landfill will greatly improve the quality of the assessment.

5.2 GROUNDWATER

GROUNDWATER DESCRIPTION

The area of the site comes under the Kalihi segment of the Honolulu aquifer. KMR is underlain by a shallow, brackish water aquifer. This aquifer is unconfined. The coral reef and limestone under the KMR are highly permeable and the water table is 3-5 ft below surface. The groundwater is hydraulically connected to the harbor, and depth to water varies with tidal action. The water in this shallow aquifer is brackish and is not used as a water supply.

The basal aquifer underlying the shallow brackish water aquifer is at a depth of 700-1000 ft. It is covered by caprock on the seaward side and hence is a confined aquifer. The piezometric head in the underlying freshwater aquifer is higher than that in the overlying brackish water aquifer (Lau, pers. comm). Therefore the possibility of contaminants travelling from the shallow aquifer to the deep freshwater aquifer is remote. The possibility of aquifer interconnection between the shallow brackish aquifer and the basal aquifer cannot be ruled out.

RAINFALL

Annual rainfall at the KMR averages 20 to 25 inches a year (Giambelluca, 1984).

SOURCE TYPES AVAILABLE TO GROUNDWATER

Source types available to release to groundwater include hazardous wastes deposited in the pre-construction disposal site, wastes that were disposed in the ground, sewerage and drainage system, wastes from leaking drums, tanks and transformers. Any accidental spills of hazardous substances would also be available for release to groundwater. Contaminants, once present in the drainage system, may infiltrate to the coral substrate. After contaminants reach the groundwater they will migrate along the drainage line until they eventually discharge into the ocean.

CONCENTRATIONS DETECTED AND THEIR RELATION TO BENCHMARKS

An observed release of hazardous substances to the shallow aquifer at the KMR has been established by chemical analysis of water from the monitoring wells. The shallow aquifer is not a source of drinking water. Barium, lead (Monitoring Wells 7,8); dichloroethane (Monitoring Wells 5,6,16,17); ethylbenzene (Monitoring Wells 4,11,12,13); petroleum hydrocarbons (Monitoring Wells 4,11,13) were observed in the brackish groundwater samples tested.

Groundwater analysis detected levels of lead, 16.7 ppb at Monitoring Well-7 and 4.5 ppb at Monitoring Well-8 (USATHAMA-EPA Method GFAA/JD 17-7421). Levels of barium detected were 13.2 ppb at Monitoring Well-8 and 38.3 ppb at Monitoring Well-9 (USATHAMA-EPA Method ICP/JS11-6010). The highest concentration of 1,2-dichloroethane detected was 6.3 ppb at Monitoring Well-16. Similarly, the maximum concentration of ethylbenzene detected was 2700 ppb at Monitoring Well-4. Zinc was detected at a concentration of 35.6 ppb at Monitoring Well-8.

POTENTIAL FOR A RELEASE

The potential for release of contaminants from the shallow caprock aquifer located immediately below the sources to the basal aquifer is low. Groundwater in the shallow aquifer ultimately seeps out into the ocean. Contaminants that are transported with the groundwater discharged in coastal areas have the potential to impact coastal ecology if present in sufficient quantities.

GROUNDWATER USE

The closest drinking water wells to the sources at KMR are located in the 1-2 mile radius. The wells are part of the Kalihi Pumping Station. The wells are connected to the Honolulu blended water system.

The Honolulu/Pearl Harbor basal aquifer system is the main source of drinking water for the Honolulu population, particularly between Pearl City and Metropolitan Honolulu. The aquifer supplies a blended water supply system that serves approximately 413,600 people from the City & County of Honolulu and the surrounding area (Ecology & Environment, 1989).

Table 2 describes all drinking water wells located within 4 miles of KMR, their pumpage and population served by them. These wells supply a blended water system that serves approximately 413,000 people from the City & County of Honolulu and the surrounding area.

Table 2. Drinking water wells within 4 miles of sources at KMR, average annual pumpage and population served.

Well Name	Well Numbers	Distance from sources (miles)	Average Annual Pumpage (MGD)	Population Served
Kalihi Shaft	2052-08	2.0	8.033	39,780[1]
Moanalua	2153-07,10	2.3	3.492	17,293
Kalihi Pumping Station	1952-06, 08, 16, 19, 22	1.3	6.587	32,619
Red Hill	2254-01	3.7	4.0155	19,885
Fort Shafter	2053-10,11	1.7	0.9073	4,493
Tripler wells	2153-07,08	2.3	0.62	3,075

5.3 SURFACE WATER

SURFACE WATER DESCRIPTION

The topography at KMR is flat Most of the area is covered with asphalt. Runoff collects in the storm drainage systems which discharge into Kapalama Basin or Keehi Lagoon. All the sources at KMR are located within the boundaries of the surface water drainage system defined by the storm sewers on site.

SOURCE TYPES AVAILABLE TO SURFACE WATER

Both point and non-point sources are available to the surface water the KMR. Point sources would be the places from where there are documented releases of hazardous materials due to the nature of activities. Building 923 (spray painting area) is a source, as evidenced by the high concentrations of lead in the storm sewers nearby. Building 917 (hazardous materials storage area) is a source of pesticides and heavy metals, given the nature of activities carried out at the building and the high concentration of the above mentioned substances in the storm drains. A major source, whose potential impact has not been discussed at all are the two old municipal landfill sites.

The rest of the sources could be classified as non-point sources due to irregularity of use and lack of documentation

[1]These wells serve a blended water system of 83.4 MGD, including 40 MGD from the pearl Harbor aquifer and 0.5 MGD from the windward side (Lao, 1991). The water system provides drinking water for the Metropolitan Honolulu population.

about spills. Since there is no flowing water stream through the site, the mechanism for transport of hazardous materials to surface water would be through storm drains.

FLOOD CHARACTERISTICS

KMR falls in the area defined by the Flood Insurance Rate Map as "Zone X: Areas determined to be outside the 500 year floodplain." 2-year, 24-hour Rainfall for the KMR is defined as less than 4 inches (Giambelluca, 1984).

MAXIMALLY EXPOSED INDIVIDUAL

No drinking water intakes exist for the surface water pathway.

KMR is located within one mile of Sand Island State Park and the Keehi Small Boat Harbor. Approximately 140 acres on Sand Island located in Honolulu Harbor provide swimming, picnicking, overnight camping and recreational opportunities for Oahu's urban population.

HUMAN FOOD CHAIN CONSIDERATIONS

The average annual fish catch within fifteen miles of KMR is an estimated 515,215 lbs (DLNR, 1991). The boat harbor at Keehi Lagoon is used by recreational fishermen. No recreational fish catch data were available.

POTENTIAL FOR A RELEASE OF HAZARDOUS SUBSTANCES TO SURFACE WATER

The storm sewers eventually discharge into the ocean. There are reports indicating that contaminants were discharged into the KMR storm sewage system in past years. In addition, contaminated groundwater and runoff from sources at KMR has a high likelihood of entering coastal waters.

CONCENTRATIONS DETECTED AND THEIR RELATION TO BENCHMARKS

Chlordane, DDD, DDT, arsenic, barium, chromium and lead were detected in storm drain sediments. Background concentrations of any of the heavy metals were not detected during the testing phase. The reasons for this are not discussed in the PA or SI. In the absence of any such data, it can only be inferred that the background concentrations of all heavy metals were below detection limits.

The maximum concentrations of the substances mentioned above and their EPA Ambient Aquatic Life Advisory Concentrations (AALAC) for saltwater are summarized in Table 3.

Table 3. Concentrations of hazardous materials detected in storm sewer sediments and their AALAC concentrations for saltwater.

Material	Concentrations detected (max)	AALAC concentrations (E&E, 1989)
Arsenic	9.47 µg/g (9.47 ppm)	3.6 µg/L (3.6×10^{-3} ppm)
Barium	171 µg/g (171 ppm)	
Chromium	79.9 µg/g (79.9 ppm)	
Lead	12,700 µg/g (12,700 ppm)	5.6 µg/L (5.6×10^{-3} ppm)
Chlordane	0.222 (2.22×10^{-2} ppm)	4.0×10^{-3} µg/L (4.0×10^{-6} ppm)
DDD	0.014 µg/g (0.014 ppm)	
DDT	0.354 µg/g (0.354 ppm)	1×10^{-3} µg/L (1.0×10^{-6} ppm)

Barium, chromium, and DDD do not have any defined AALAC concentration limits. It can be seen from the above table that the maximum concentration detected in the sediments is significantly above the AALAC limit for all the materials which have defined limits. However, it has to be noted that the AALAC limits are for saltwater, whereas the concentrations detected were for storm sewer sediments. The concentrations of different contaminants in the stormwater runoff are likely to be lower than their concentration in sediments.

SENSITIVE ENVIRONMENTS

No endangered or threatened species are recorded from KMR and none is expected to occur due to the absence of required habitat. The U.S. Fish and Wildlife Service agree with this assessment. At the KMR, lack of vegetation and urban environment result in a poor habitat for wildlife.

A description of the wetlands within 4 miles of the site is provides in section 5.5 (AIR).

5.4 SOIL EXPOSURE

SOIL CONTAMINATION

The potential exists for exposure of the personnel at KMR to soil contaminants. SI sampling revealed soil contaminated with chlorinated pesticides (Chlordane, DDT, DDE) and metals

(arsenic, barium, chromium, lead). In addition, floors of several buildings were contaminated with the same materials. Approximately 83 people work on base, within a quarter mile of the sources of contamination. The sources are accessible to personnel allowed on base. There is no recreational use of the area.

Buildings 917, 923, and 931 seem to be the major sources contributing to the contamination of soil. The walls and floors of many buildings are contaminated with hazardous substances due to the nature of activities carried out (i.e., painting, fumigation) or spills of chemical during storage and transportation. Other source types available to the soil exposure pathway are the waste oil drums, transformers throughout the site and the forklift maintenance area, from where the by products of the maintenance operations can contaminate the soil.

ACCESSIBILITY/SITE SECURITY

Access to KMR is restricted to military and civilian personnel working on base. The hazardous materials are stored in different buildings with adequate precautions. Once in the soil, there are no containments for the prevention of exposure. Exposure could be mainly through dermal contact or inhalation, the possibilities of which are low due to the nature of use of the site by the base personnel.

POPULATION

Approximately 83 people work on base. Land use designated in the areas surrounding KMR is zoned industrial. There are no full-time residences, schools or childcare facilities located in the KMR.

5.5 AIR

POTENTIAL FOR A RELEASE TO AIR

There are no containments for the prevention of migration of contaminants to the air pathway. None of the sources have adequate information to document a release of hazardous substances to the air by chemical analysis. In the absence of any air sampling, an observed release cannot be established.

Wind direction at KMR is predominantly affected by trade winds from the northeast to the east. Occasionally the trade winds are affected by winds from other directions, particularly the southerly Kona Winds.

MAXIMALLY EXPOSED INDIVIDUAL

The nearest individuals to the sources are the personnel working near them. The breakdown of personnel working in different buildings is not provided in the documentation reviewed. The site visit conducted by the Environmental Center

indicated that there were approximately 20 personnel working in Building 923.

POPULATION

The areas surrounding the KMR are zoned industrial. There are large population centers of central Oahu (Kalihi Kai and Kalihi) to the north.

SENSITIVE ENVIRONMENTS

Sensitive environments, including wetlands within 4 miles of the sources at KMR are (Miller et al., 1989):

1. Fort Kamehameha: Coastal wetland occupying about 1.25 miles along the coastline with a total area of about 67.4 acres. Located about 3.5 miles from the site, it is adjoined by the reef runway to the south and the Hickam golf course to the north. The southernmost portion of the wetland habitat runs parallel to the reef runway. No endangered species are known to use this habitat.

2. Reef Runway: A 792 acre coastal wetland surrounding the fringe area of the reef runway, which is a man-made, marine coastal habitat for the federally designated endangered species, the Hawaiian Stilt. The Reef Runway is situated about 3 miles from the site.

3. Keehi Lagoon: Keehi Lagoon, consisting of tidal flats, shallow water, and small islands has a total area of 450 acres. Located about 3,000 ft from the sources on the site, the area is used by the federally endangered Hawaiian Stilts for feeding and resting. The state endangered Hawaiian Owl (Asio flammeus sandwichensis) has also been observed here.

5.6 ON-SITE EXPOSURE

There is a significant likelihood of on-site exposure, especially for the personnel working near the contaminated areas. On-site exposure would be from contaminated walls and surfaces of buildings, contaminated floors, and from Asbestos Containing Building Materials (ACBMs) which are present in large amounts in most buildings. The types of contamination mentioned above pose a threat to the personnel working nearby.

ACBMs were detected in all buildings tested during the SI testing. The SI testing also identified about 75,460 ft^2 of ACBMs in Phase III and the western ceded parcels of the KMR.

Paint scrape samples collected from Building 923 had lead concentrations of up to 9610 ppm (information from the SI is not clear). Chlorinated pesticides and metals were detected in the concrete floors of several buildings. The area of concern is the

potential exposure to the site personnel working in buildings with contamination to exposure from the top 2 feet of the contaminated surfaces.

6. CURRENT CONDITIONS

In 1987, Unitek Environmental Consultants removed an underground storage tank at the KMR Phase I property. At the time of removal, the tank contained both gasoline and water. Groundwater was not tested at the time of tank removal because current UST regulations were not in effect at that time.

In 1989, Dames and Moore reported the results of an extensive subsurface investigation of Phase I property. Their results showed the presence of a free floating hydrocarbon plume centered around the location of the former underground storage tank. Dames and Moore remediated the Phase I site around the former tank location based on these data. Woodward Clyde Consultants (WCC), contracted by the Army in 1989 reported the presence of a free product and dissolved hydrocarbon plume around the former location of the Underground Storage Tank on the Phase I property. The dissolved phase was indicated as encroaching on the Phase II property across the access road to the south.

In 1989, Unitek removed an underground Storage Tank from Phase IIA property and reported levels of Total Petroleum Hydrocarbons (TPH) as gasoline and diesel at 6.1 and 72.0 ppm, respectively, in the soil around the fill pipe. The soil around the fill pipe was excavated and removed at the time of tank removal.

The SI report recommended the removal of all identified ACBMs in buildings located on Phase III and western ceded parcels prior to any planned demolition or renovation.

There was a reported PCB leak from a pole mounted transformer as mentioned in an earlier section of this report, outside building 935 in 1991 (Riki Iwasaki, pers. comm.). The total quantity of PCBs leaked was estimated to be 2 gallons. The asphalt at the spill site had a PCB concentration of 3900 ppm. The spill was reported as per EPA procedures. The contaminated soil around the site was excavated and removed in accordance with EPA and DOH procedures. The transformer pole was removed and disposed in a similar fashion.

7. CONCLUSION

The KMR appears to be eligible for inclusion on the National Priorities List, based on the following factors:

1. High concentration of metals and chlorinated pesticides in the groundwater and storm sewer sediments.

2. Presence of contaminated soil on site.

3. Large quantities of Asbestos Containing Building Materials (ACBM) on Phase III and western ceded parcels on site.

SI testing for soil and groundwater contamination did not take into account the effects of a previously used landfill. SI testing of groundwater was geared towards the establishment of Total Petroleum Hydrocarbons (TPH) contamination. Since petroleum contamination is not covered under the purview of RCRA, this does not impact on the total score of the site.

KMR may be eligible for inclusion in the NPL. We recommend groundwater testing for contamination by the pre-construction sanitary landfill. This would help in the accurate determination of wastestream quantities on site.

8. EPA RECOMMENDATION

	Initial	Date
No Further Remedial Action Planned	cjd	4/22/92
Listing Site Inspection		

Notes: Extreme low potential of substances to migrate to the drinking water aquifer. Will refer sites to Water Division
CJ. Douglas

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